Dov Michaeli, Ph.D.
Assistant Professor of Biochemistry
and Surgery
School of Medicine
University of California, San Francisco
San Francisco, California 94143

Effect of Cigarette Smoke on Pulmonary Fibroblasts and Collagen and Its Relation to Emphysema.

The objects of this project are to:

a. Study the immunogenicity of cigarette smoke components complexed with lung collagen by the radioimmunoassay (RIA) technique.

b. Study the effects of components of the gaseous phase of cigarette smoke on the division rate of lung fibroblasts, and on the synthesis and secretion of collagen and mucopolysaccharides.

c. Identify the cellular site(s) of action of cigarette smoke components.

d. Study the chemical interactions between cigarette smoke components and matrix macromolecules, and the possible effect of such interactions on the biosynthetic activity of lung fibroblasts.

e. Study the immunopathology of emphysematous lungs using immunoelectron-microscopic techniques.

To investigate these objectives, a multidisciplinary approach will be taken. Lung collagen will be reacted with aldehydes present in the gaseous phase of cigarette smoke and antibodies against this antigen will be produced in experimental animals. The antigen will also be assayed for in sera of patients with emphysema. In another approach, lung fibroblasts (WI 38) will be exposed to aldehydes of the gaseous phase of cigarette smoke, and its effect on their synthetic and proliferative activity will be tested. Synthetic activity will be measured by assay of synthesis of new collagen. Proliferative activity will be assayed by uptake of radioactive thymadine. The cellular sites of action of cigarette smoke components will be studied using radioactive aldehydes and cell fractionation.

The investigators are in the process of obtaining antibodies to the aldehyde-triggered collagen. Experiments on the localization of aldehydes in cell components are underway. A radioimmunoassay for lung collagen has been perfected in their laboratory and is currently in use.

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